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Geostationary Earth Radiation Budget

GERB Project Status

Imperial: Helen Brindley (GERB PI)

Jacqui Russell	(GERB project scientist)
James Rufus	(GERB operations scientist)
Rich Bantges	(NCEO funded Obs4MIPS product scientist)
Jon Murray	(GERB 4 / GERB 3 cross-cal scientist)

RAL Space: Andy Smith (Level 1 Project Manager)

Martin Bates (Level 1 Software development and processing)

RMIB: Nicolas Clerbaux (Level 2 Project Manager)

Christine Aebi (Validation Science)
Edward Baudrez (RGP operational processing and product development)
Johan Moreels (RGP operational processing and product development)

Presenter: Jacqui Russell (Imperial) Meeting: CERES STG meeting April 2020

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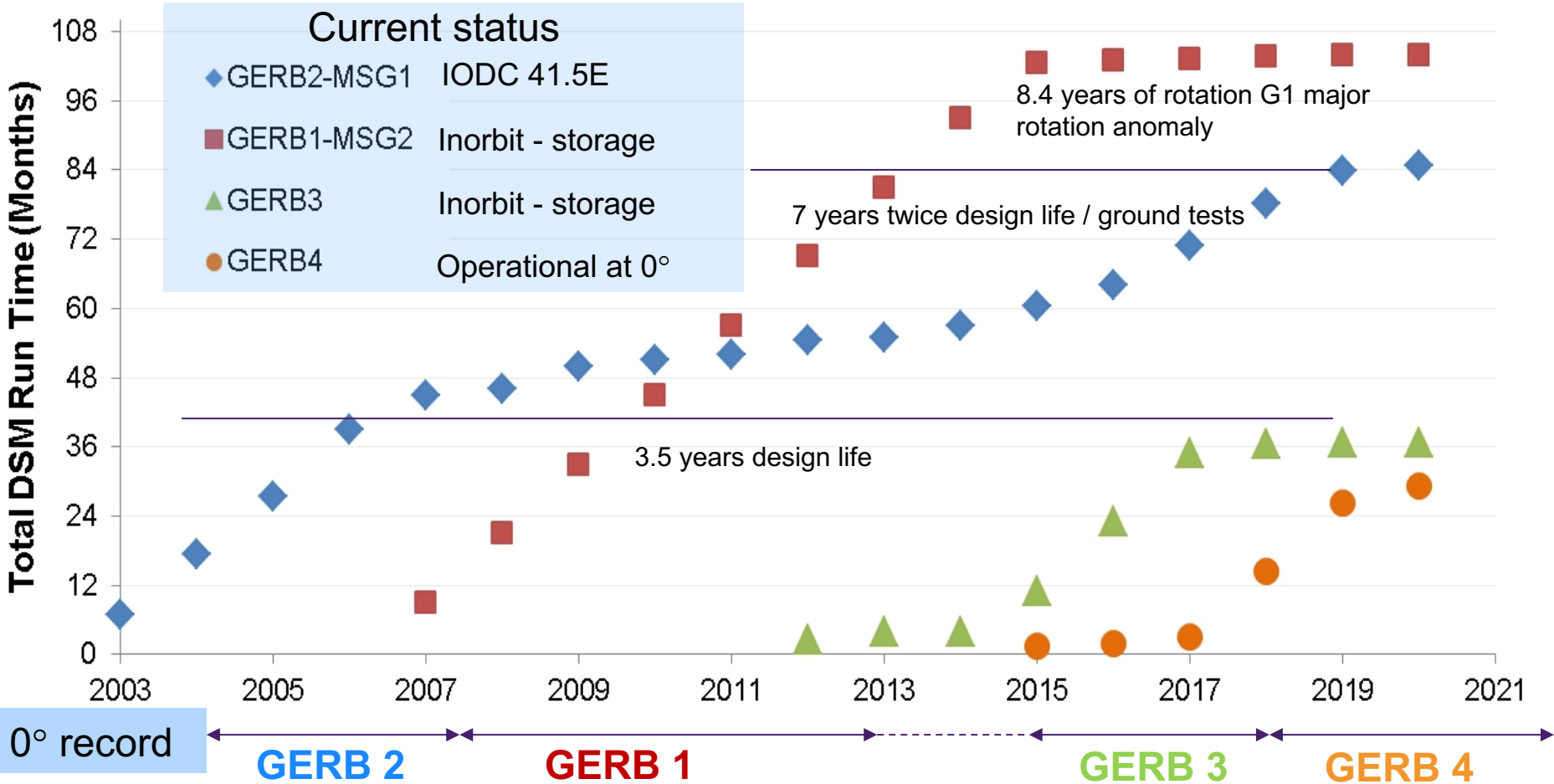
GERB instrument status and life

Met-8 (G2) planned end of service in June 2022 and re-orbiting October 2022.
Met-9 (G1) possible relocation to IODC in Q1 2022 pending EUMETSAT council decision.
MSG planned for operations beyond 2024, GERBs will be operated where available with SEVIRI
Possible opportunity for co-location of MTG and MSG (3 or 4) during MTG commissioning period



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GERB product production status

Indian Ocean data (GERB 2 @ 41.5°E)

- IODC since 2017 but mirror side calibration difference and N Hemisphere pointing accuracy issues need processing changes

GERB 3 0° record 2015-2017

- Reprocessed to correct for mirror side aging in the SW, some LW artefacts remain.

GERB 4 operational @ 0°

- Bug corrected in normalisation of unfiltering coefficients for GERB 4 which resulted in 5-6% elevation in SW products. Fixed and record reprocessed.

GERB 1 Ed 1 record

- Monthly diurnal (monthly-hourly) average products produced for 2007-2012 record in CF compliant netCDF product for model comparison. (Will submit to Obs4MIPs).

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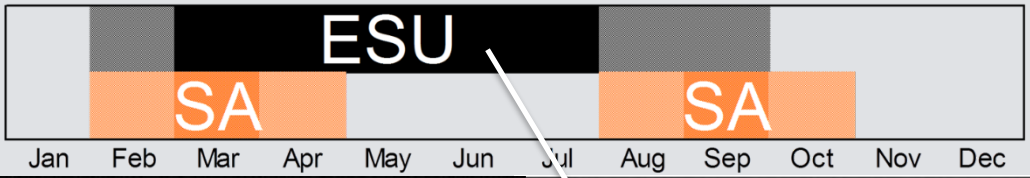
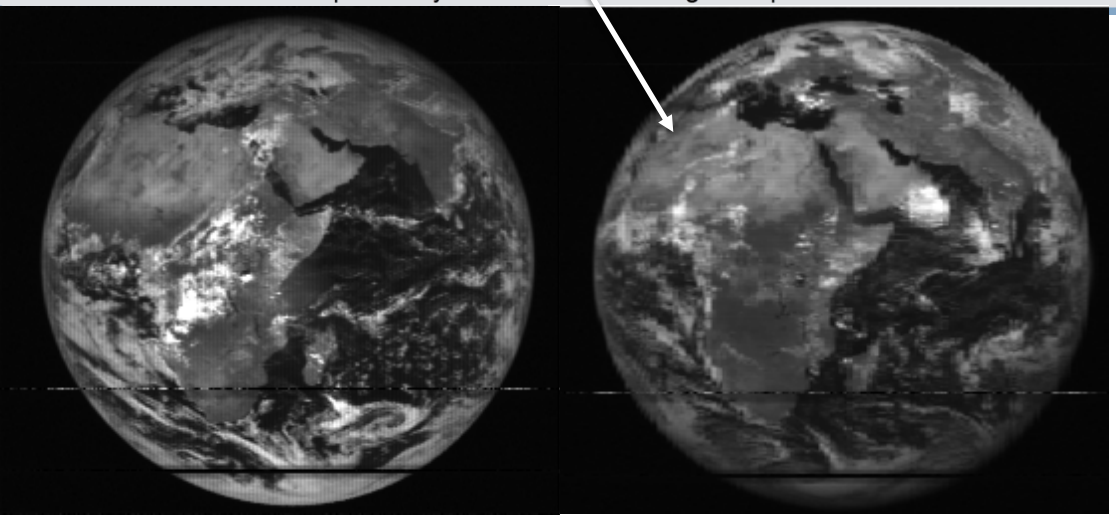
Indian Ocean data products (GERB 2)



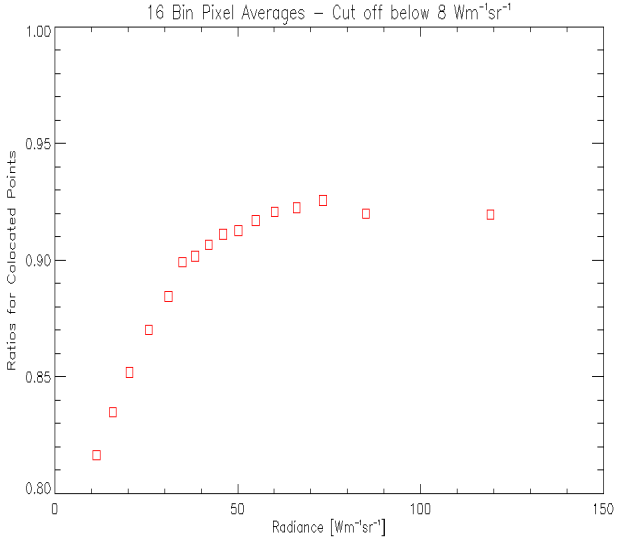


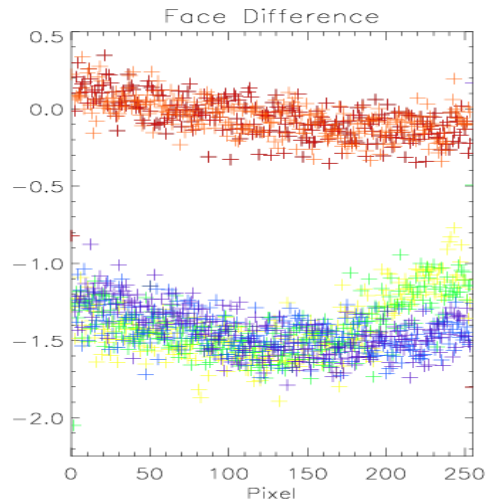
GERB 2 currently IODC at 5.3 years of rotations accumulated.
Expectation of running until MSG-1 re-orbit in 2020.

During extended storage GERB 2 experience significant degradation to one side of the mirror.

A satellite issue limits the accuracy of pointing information during the N Hemisphere summer requiring additional processing steps to correct.

Solution to both these issues is being tackled by taking longer more closely spaced scans and using only the good mirror side. Scan line position is corrected using information on mispointing from SEVIRI and spatial interpolation.





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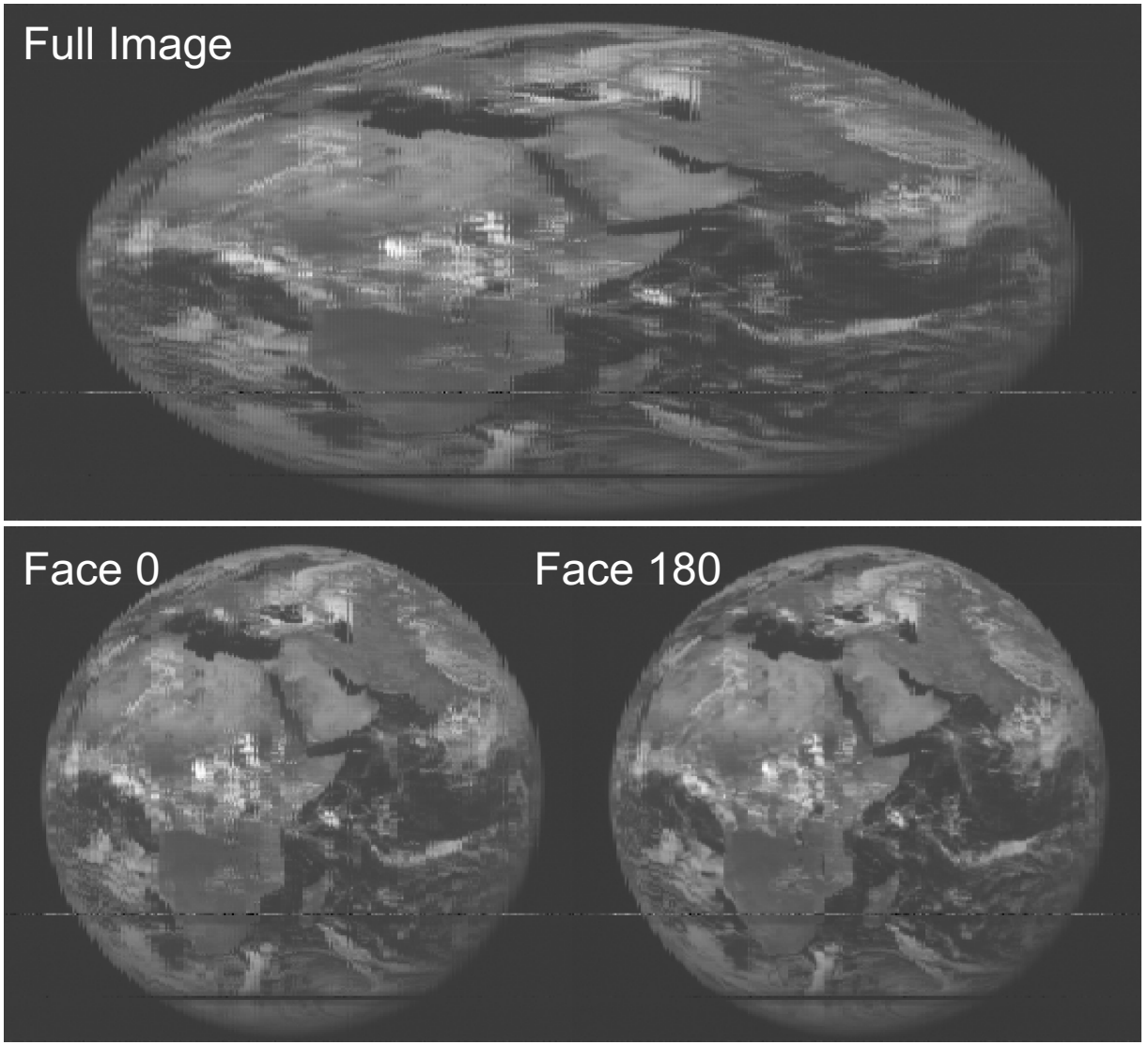
564 Column NORMAL Scans for GERB 2 at 41.5°E

In order to avoid the difficulty of interpolating a regular image using mirror sides with different properties a 564 column image acquisition has been started (9 UTC 6/6/17)

TSOL correction from SEVIRI to correctly locate the 282 face 0 columns and interpolation to a regular grid is proposed to regenerate a standard NORMAL image.

The disadvantage is the doubling of image gathering time.



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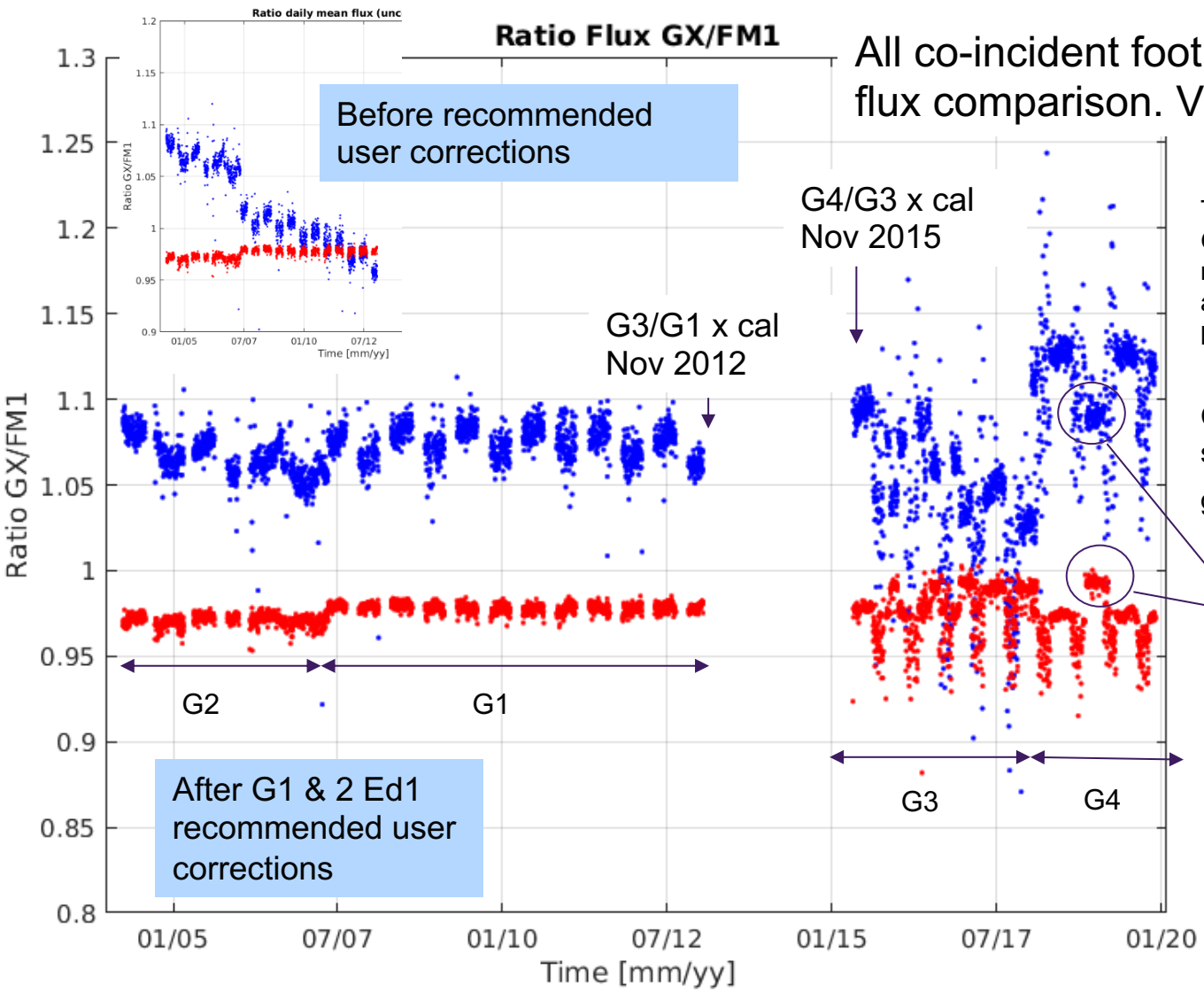
Time series of all GERB records / CERES FM1 SSF Ed 4.1 footprint matched fluxes



All co-incident footprints matched for flux comparison. VZA < 80

Temporal stabilization based on GERB / CERES SSF FM1 Ed 3 radiance comparison. FM1 xscan angular matches occur at low latitudes (±20°).

Correction does not account for full spectral nature of aging just a gross level correction.

Quartz filter vignetting In parts of GERB 4 and GERB 3 records

The Ed 4.1 comparisons seem to give greater elevation of GERB SW c.f. CERES by a few percent than the Ed 3 comparisons. But the comparison method differs too.

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GERB Operational product summary

Indian Ocean data (GERB 2 @ 41.5°E)

- Solutions for noisy satellite pointing and mirror side differences will be run operationally when normal(ish) working practices resume.

GERB 3 0° record 2015-2017

- Ed 3 comparisons ⇒ GERB 3 radiances 1% brighter than G1 after scene dependent adjustment and 2% brighter scene independent. GERB/GERB Flux comparison with scene independent G1 correction shows 2.5% brighter. Ed 4 flux comparisons corroborate.
- SW trend in reprocessed record, could be aging or an issue with the mirror side correction.
- Quartz filter vignetting anomaly affects significant portions of the GERB 3 record and requires further treatment

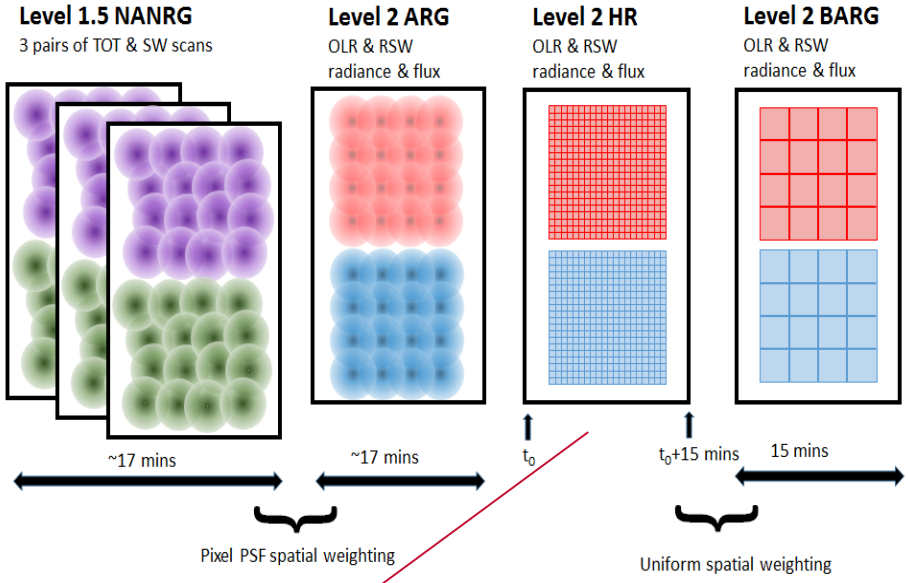
GERB 4 operational @ 0°

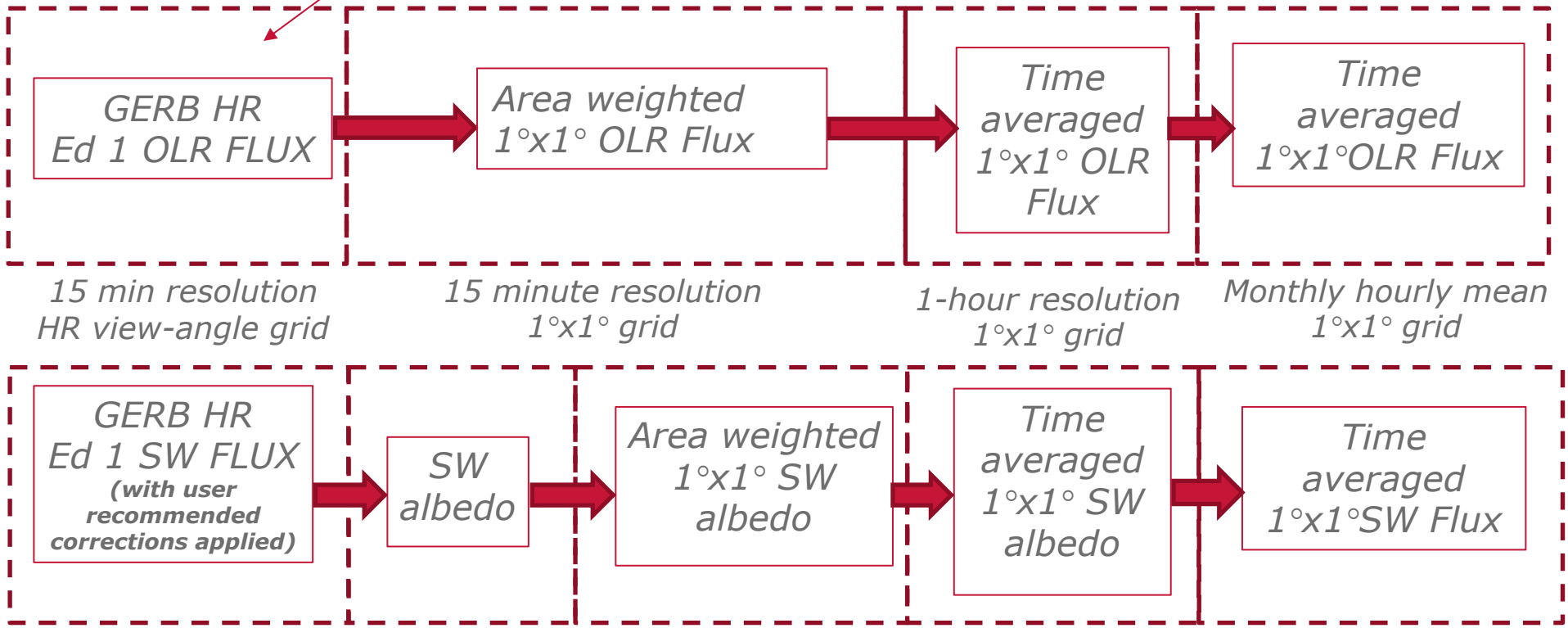
- Bug corrected in normalisation of unfiltering coefficients for GERB 4 which resulted in 5-6% elevation in SW products. Fixed and record reprocessed. L2 comparisons show GERB 4 still brighter in SW compared to FM1 than other GERB instruments.
- Quartz filter vignetting anomaly found to affects a few months of data (Nov 2018 to mid March 2019), requires correction in processing

GERB 1 Ed 1 record

- New production of monthly hourly average products produced for 2007-2012 record in (netCDF CF complaint products ops4MIPs compatible format)

GERB obs4MIPs monthly hourly average products





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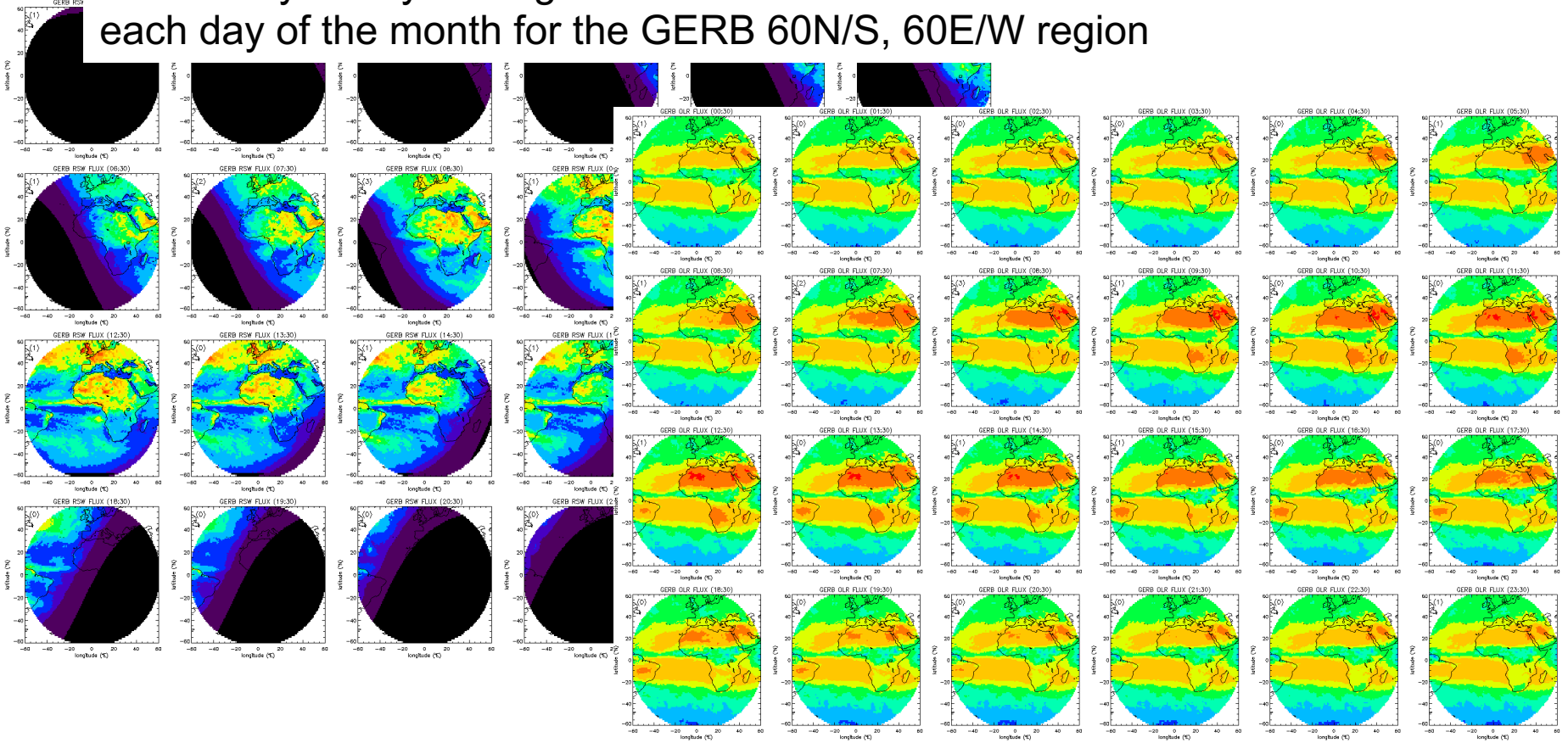
Monthly hourly CF complaint netCDF files 1 files

24 monthly hourly averages from the 4 15' timeslot HR observations for each day of the month for the GERB 60N/S, 60E/W region



Only months outside the GERB 'eclipse seasons', i.e. Jan, May, June, July, Nov, Dec

If more than 5 days of missing data for an hour it is not produced.

Currently for GERB 1 record May 2007 – Dec 2012

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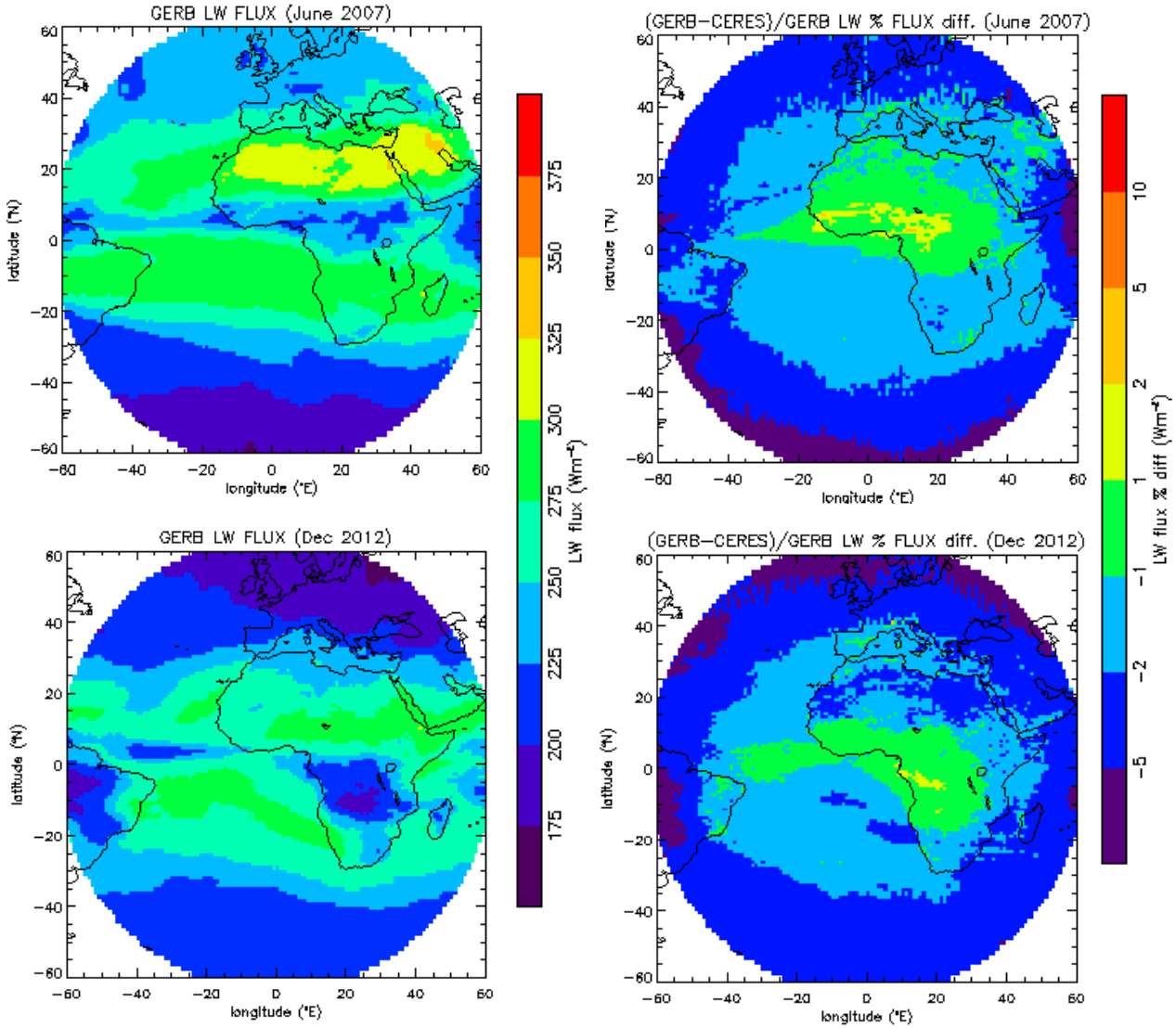
GERB obs4MIPs / CERES EBAF Ed 4.1 monthly average LW flux comparison



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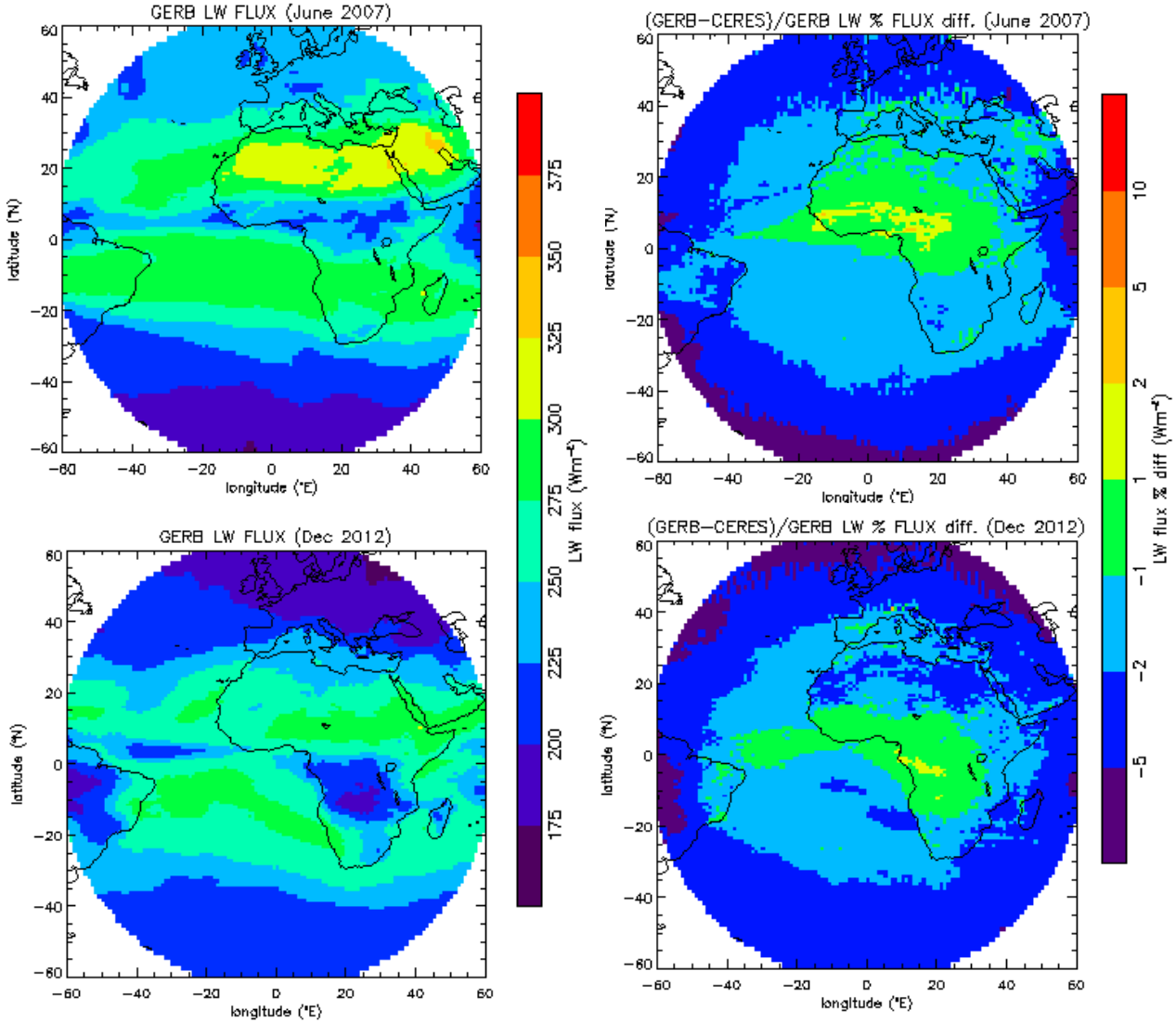
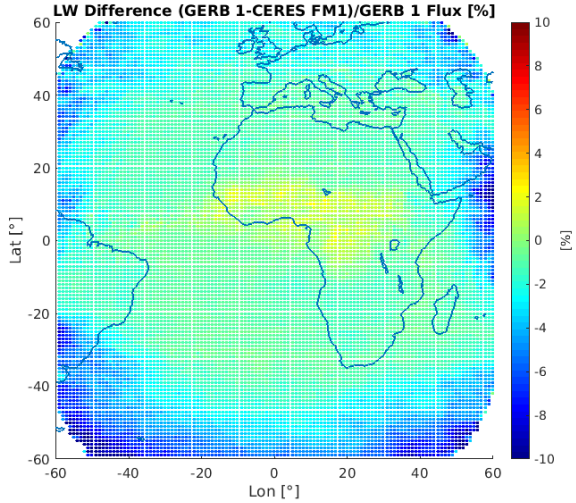
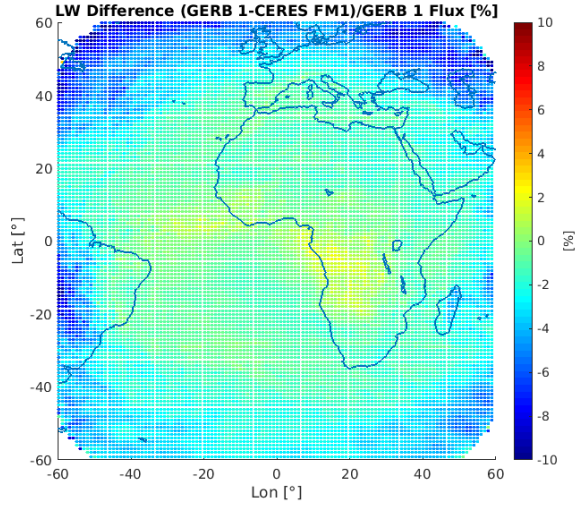
GERB obs4MIPs / CERES EBAF Ed 4.1 monthly average LW flux comparison

Footprint matched FM1 SSF Ed 4.1







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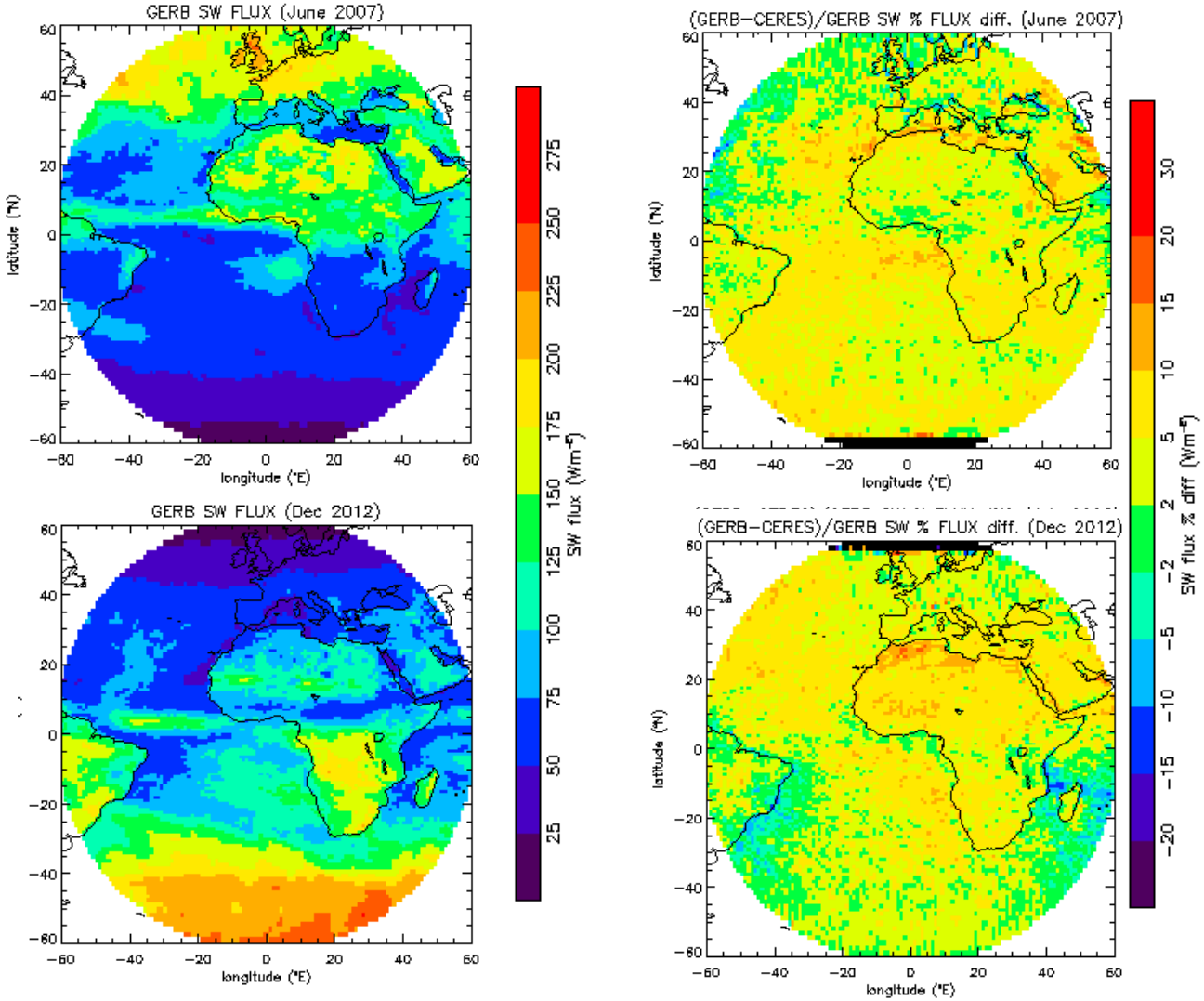
GERB obs4MIPs / CERES EBAF Ed 4.1 monthly average SW flux comparison



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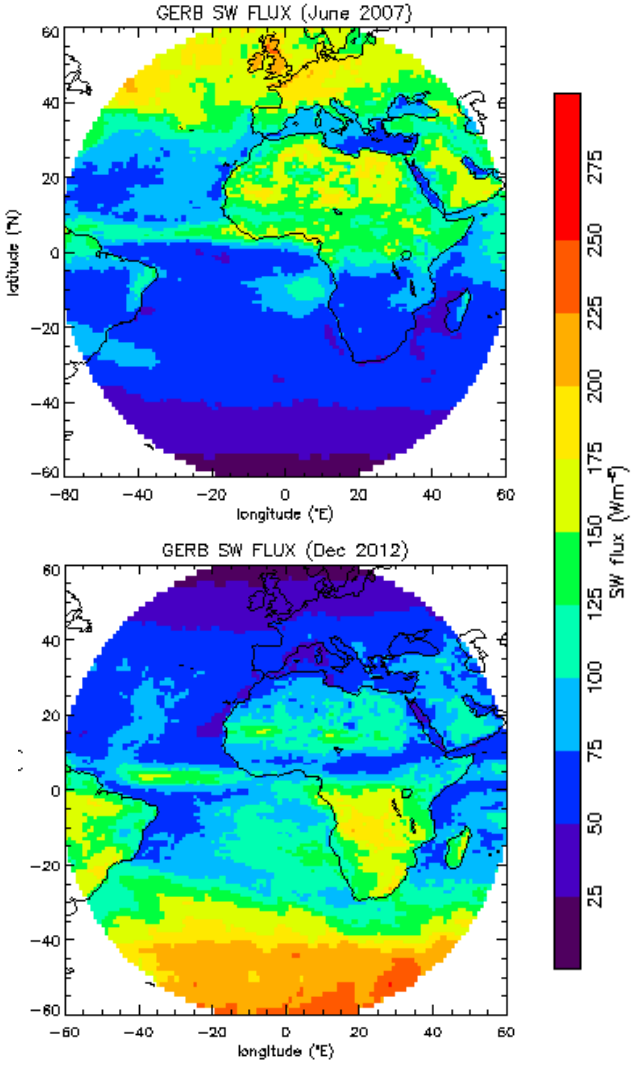
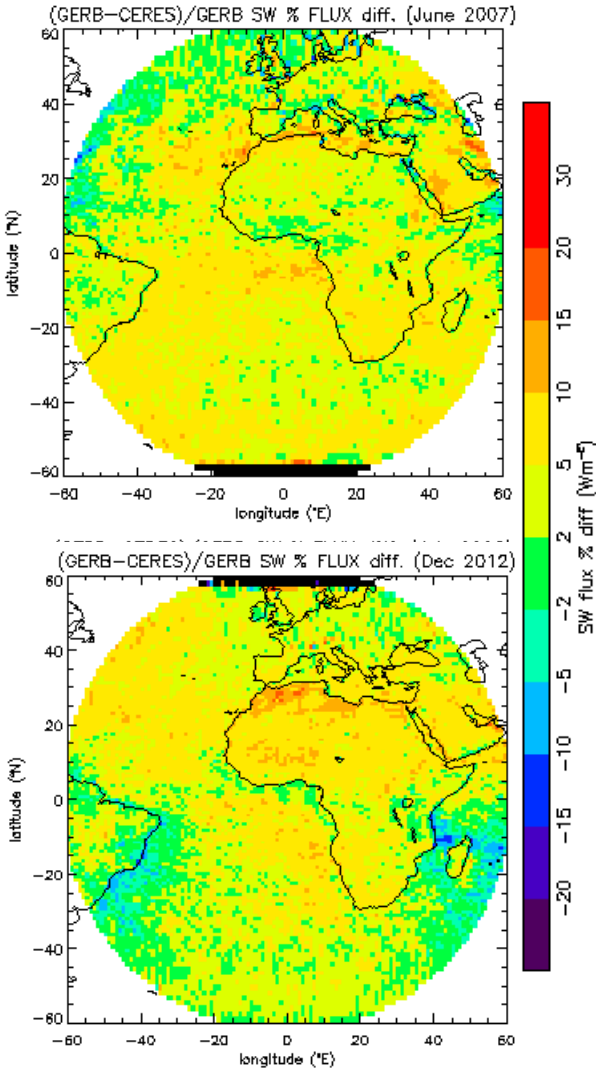
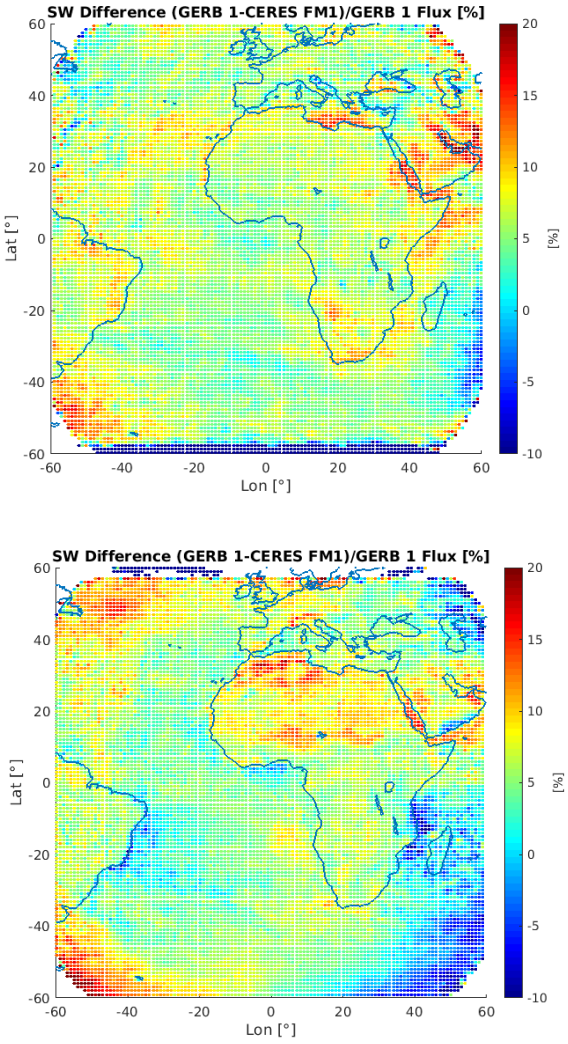
GERB obs4MIPs / CERES EBAF Ed 4.1 monthly average SW flux comparison

Footprint matched FM1 SSF Ed 4.1







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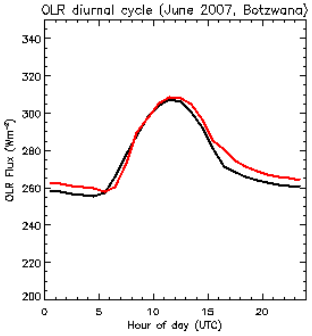
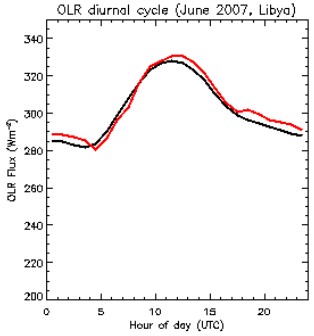
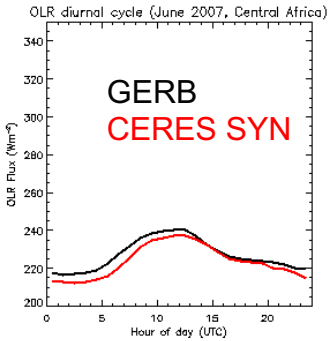
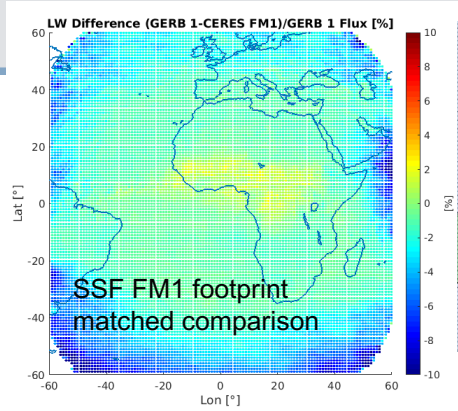
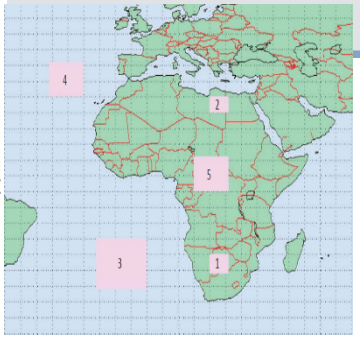
GERB obs4MIPS / CERES SYN 1 degree 1 HM Ed 4.1 LW flux comparison June 2007

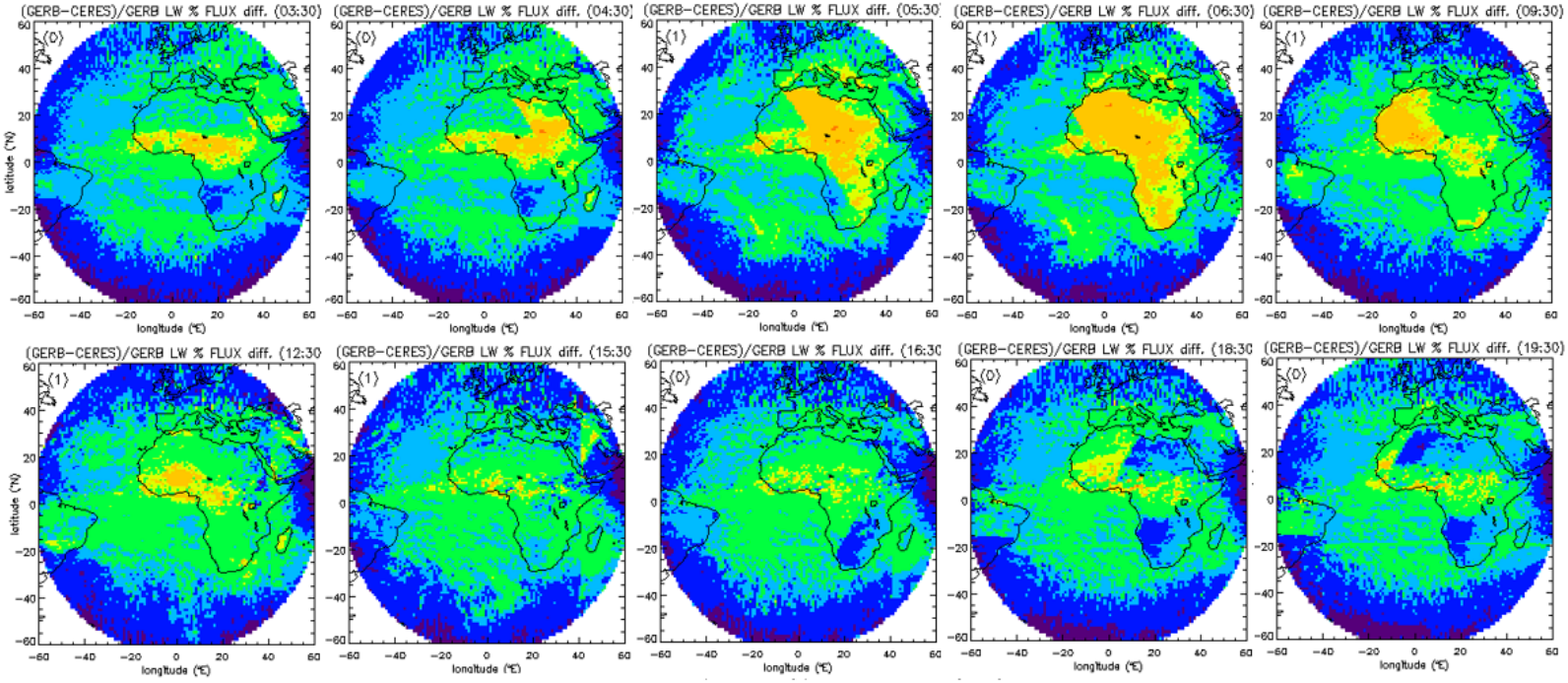




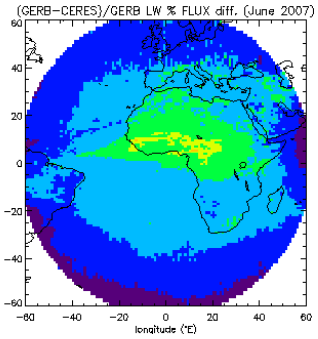








Monthly av comparison with EBAF



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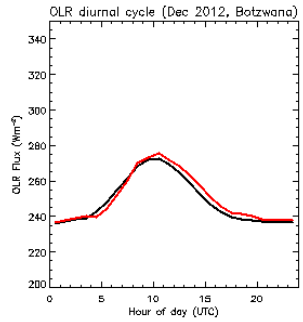
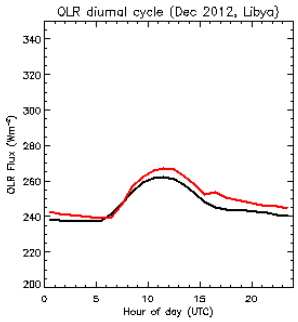
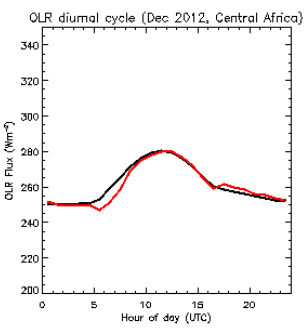
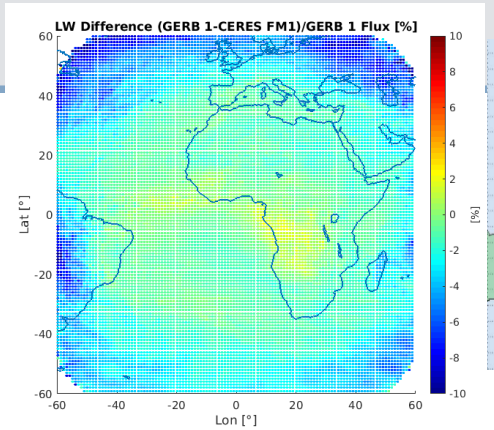
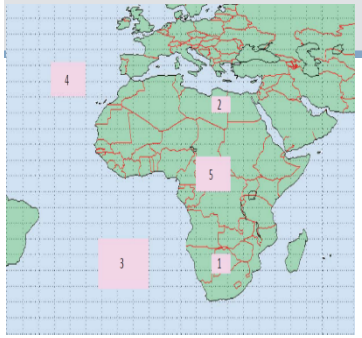
GERB obs4MIPS / CERES SYN 1 degree 1 HM Ed 4.1 LW flux comparison Dec 2012

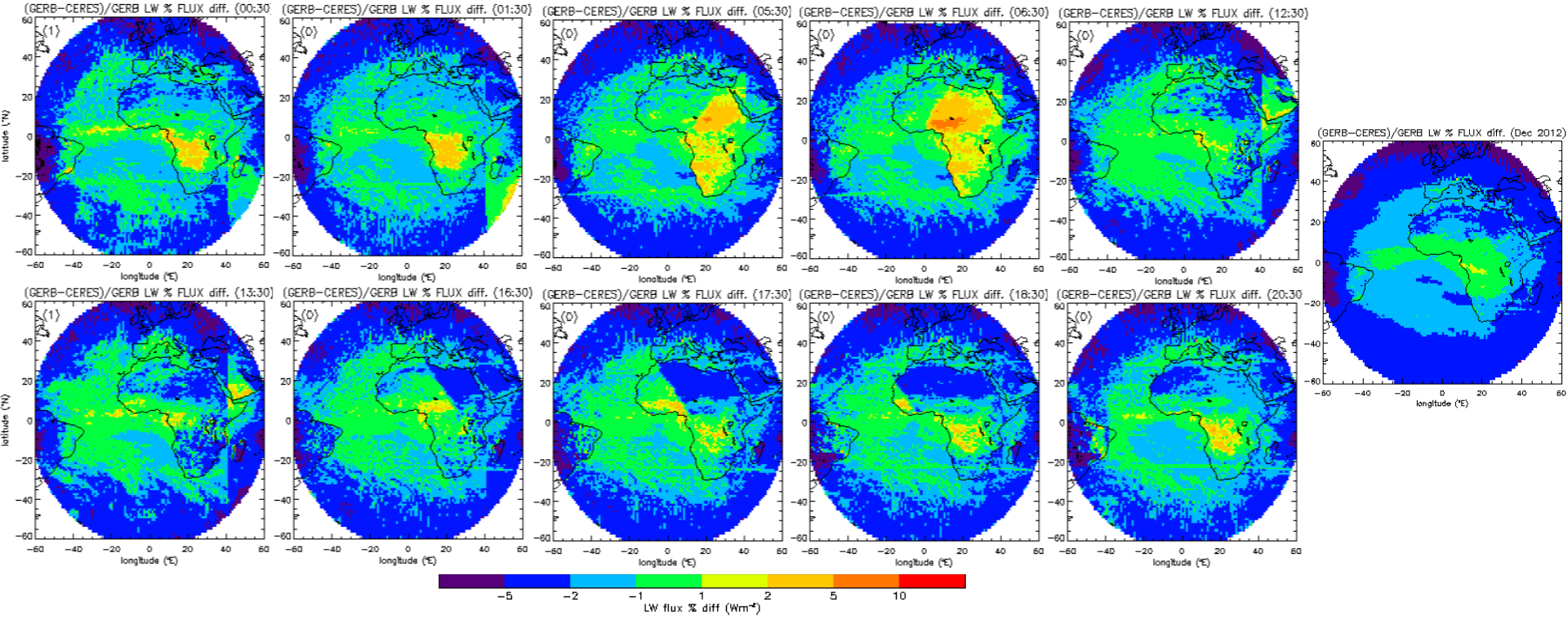












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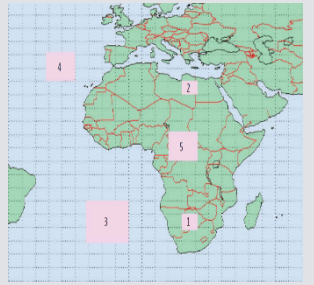
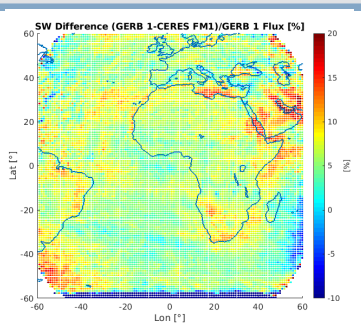
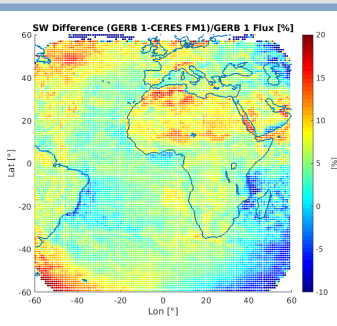
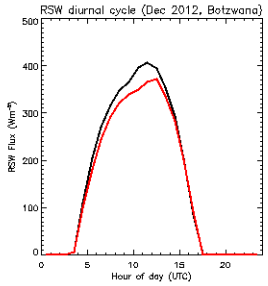
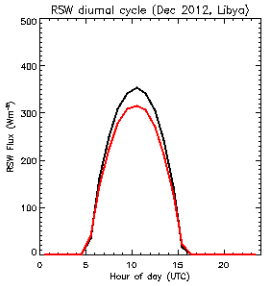
GERB obs4MIPS / CERES SYN 1 degree 1 HM Ed 4.1 SW flux comparison

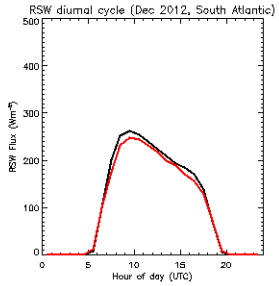


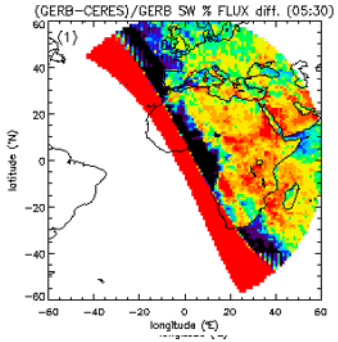


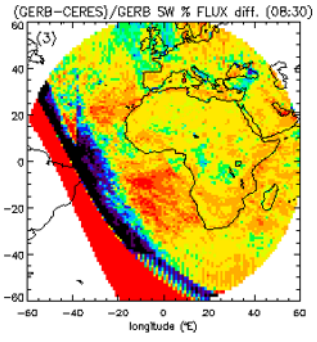


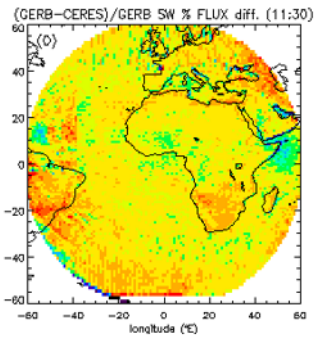


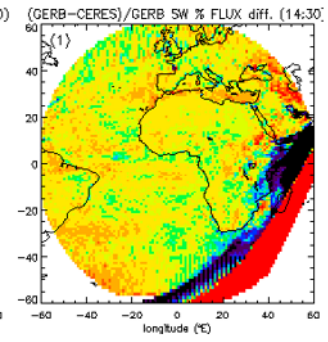


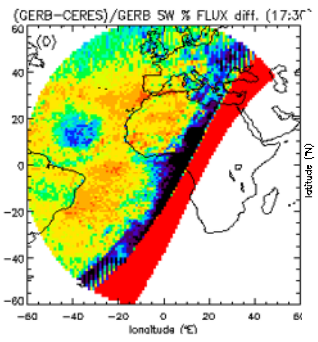


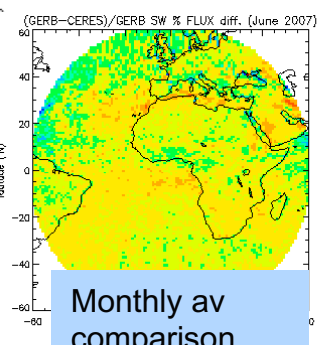


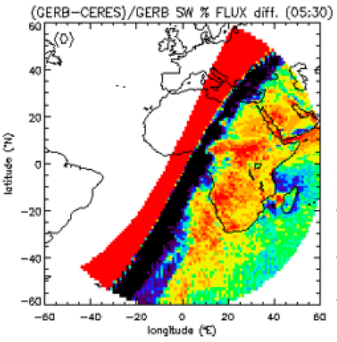


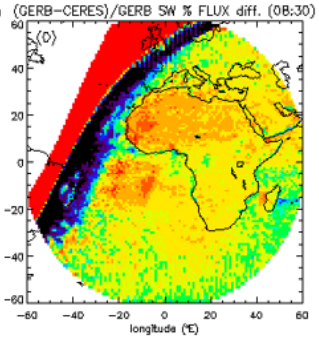


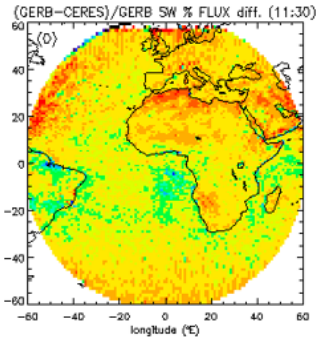


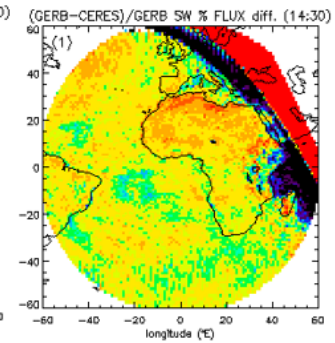


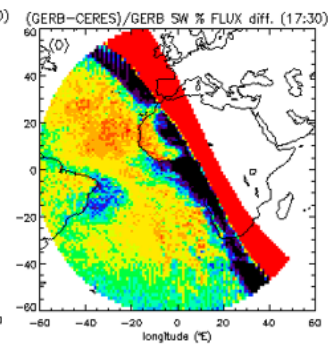


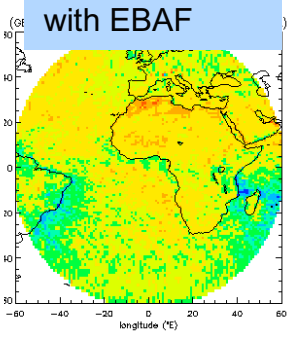




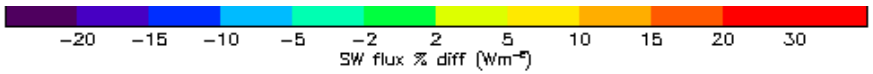








Monthly av comparison with EBAF



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Summary

- GERB 2 - Solution to in Indian Ocean products soon to be implemented
- Comparison results for corrected GERB 2 and GERB 1 Edition records show improved stability and homogeneity
- GERB 3 and GERB 4 records to be corrected for anomalous filter operation effects and absolute level differences and trends investigated
- GERB 1 monthly hourly products for obs4MIPs produced and under final evaluation